

Orca3D Release Notes

Orca3D is a plug-in for designing and analyzing marine structures in Rhino. These release notes describe the status and updates included in the current release of Orca3D.

Orca3D Requirements

- Rhino™ (by McNeel) Installation:
 - Rhino Version 6.11 (12/14/2018) or higher
 - Orca3D will not run with Rhino 4 or Rhino 5
- Hardware:
 - See Rhino hardware requirements at http://www.rhino3d.com/system_requirements/
- Operating Systems tested: Windows 7, 8.1, 10
 - All other Windows operating systems **have not** been tested but may work
 - Mac: The Intel Mac with Boot Camp **has not** been tested but may work
- Operating System Pre-Requisites: (Note - The Orca3D installation will attempt to install any not already on your computer)
 - Microsoft .NET Framework 3.5 SP1 and 4.5.2
 - Microsoft Report Viewer Redistributable 2010
 - Microsoft Visual C++ 2014 Runtime Libraries
- The Offset Table and the CFD Report functions require Microsoft Excel
- Valid license key (without this, Orca3D will operate as a 15-day fully functional evaluation copy)

Release 2.0.6 (January 2019)

Enhanced Features:

- Modified hydrostatics report to include righting moment (in addition to righting arm) if it is not a stability criteria evaluation analysis.

Bug Fixes:

- Several modifications with respect to heeling arm definition and persistence including allowing for a non-integer power in the cosine distribution for custom heeling arms, fixing a bug that prevented custom heeling arm with user-specified values from being created, and fixing a serialization bug applicable to all heeling arms.
- Fixed a bug in the bulbous bow functionality associated with the ship hull assistant in which a non-default model orientation could cause the bulb to be drawn in the wrong orientation. Also modified the bulb definition to be independent of draft by changing the bulb height input from a non-dimensional height as a fraction of draft to a dimensional height above baseline. With this change the draft input can still be used to set the reference height in the ship hull assistant. Fixed a units display issue in the ship hull assistant form for bulb dimensional input parameters.

Release 2.0.5 (January 2019)

Enhanced Features:

- Added FastShip “.srf” file format to the list of supported file types.

Bug Fixes:

- Fixed a bug in retrieving saved hull and bulb parameter values from saved ship hull assistants after the addition of the bulbous bow creation capability.
- Fixed a units bug in the FastShip .pex file import.
- Fixed a bug in which the Rhino “cut” command would cause an Orca error dialog to pop-up.

Release 2.0.4 (January 2019)

Enhanced Features:

- Extended the OrcaSimericsAnalysis command for performing CFD self-propelled simulations to include the option to define propeller performance based on the Gawn-Burrill propeller series (in the non-cavitating operating regime). The Gawn-Burrill series consists of 3 and 4-bladed propellers with segmental sections defined by flat faces and circular backs that are generally considered to be representative of the

propeller blade shapes used in the small craft recreational boat industry.

Bug Fixes:

- Fixed a bug in the sailboat hull assistant that could cause forward waterline endings below the forefoot to meet centerline at non-perpendicular angle.
- Modified lines drawing command so that the current layer that existed before creating the lines drawing is restored after the command successfully completes.
- Modified the offset table command to implement a more robust method to retrieve the Orca sections used for the table.
- Fixed a bug in the Orca installer that could cause an error when installing VC++ 14 Runtime Libraries.

Release 2.0.3 (December 2018)

New Features:

- Orca now supports import and export of Precal hull offset files. The import functionality is provided through the standard Rhino file open/import dialog, and export is provided through the OrcaExportCurves command.

Bug Fixes:

- Fixed a bug in the Orca installer that could cause a CopyMinder licensing issue when replacing the V2.0 WIP with the new release build.

Release 2.0.2 (December 2018)

This is the initial full release of Orca3D V2 targeting Rhinoceros 6.

New Features:

- A new command, OrcaCreateStrake, was added to provide a convenient method for creating lifting strakes on planing hulls. The command allows the user to define the base curve for the lifting strake as an iso-parametric curve on the surface, a planar section curve on the surface, or any user-defined surface curve. The strake cross-section geometry, longitudinal extent, and taper characteristics can also be defined. The resulting strake geometry can be optionally joined to the hull surface.
- A new Orca3D Hull Assistant has been added for creating developable hull shapes. This new assistant uses Rhino's developable loft functionality to generate hull forms based on user-controlled deck

sheer, chine, and bottom profile curves. An optional chine flat may be included. Note that due to a bug in Rhino 6 SR11, the chine flat surface creation may fail. McNeel is expected to address this issue in SR 12. In the meantime, the user can manually construct a surface between the two curves bordering the chine flat after the rest of the geometry has been created.

Enhanced Features:

- The Orca3D Ship Hull Assistant has been extended to allow incorporation of bulbous bows into the generated hull geometry. If the option to create a bulb is selected, the user can control the length, height, width, and cross-section shape of the bulb. The resulting bulb geometry is integrated into the hull as part of the same surface.
- OrcaCreateCfdReport, was enhanced to include computation and plotting of non-dimensional drag coefficients (C_f , C_r) along with the computation of the ITTC 1957 C_f values for comparison. Added a table of definitions to the report output. Modified the user interface for creating the report to allow multi-select of simulations to include/exclude from the report, making selection easier. Added color-coding of worksheet cells that are expected user input and protected the workbook to avoid inadvertent modification.
- Added RhinoScript access to certain Orca3D objects, such as the most recent stability calculation results.
- Added the ability to define Orca section locations interactively using mouse selections.

Bug Fixes:

- Fixed a bug in the OrcaSimericsAnalysis command to address an issue when running self-propelled simulations across multiple propeller RPM values.
- Fixed a bug in the OrcaPlaningAnalysis command related to computing deadrise angle (which had caused zero-deadrise hulls to fail in the command).
- Fixed a bug in which Rhino block instance geometry was not properly handled for hydrostatics and weight/cost component calculations.

Work-In-Progress Release 2.0 (October 2018)

- Orca3D version 2.0 targets Rhinoceros version 6. This is the initial WIP release of Orca3D v2. Note that since Rhino 6 only targets 64-bit platforms, there is now only a 64-bit version of Orca3D.
- The licensing system that was used in Orca3D Version 1.x (Nalpeiron) is being replaced by a system called CopyMinder. The V2 WIP will initially have two versions, one for each licensing system. We will be

phasing out the Nalpeiron system. You may contact us at sales@orca3d.com to receive your CopyMinder License Key. Please be sure to include your Nalpeiron License Code with your request.

- The HydroComp Drag Library has been replaced by our own for the Savitsky and Holtrop resistance methods. Our library has been thoroughly tested using the published sources. However, due to differences in interpretation of the methods, you may see small differences (generally <5%) in the results for the same hull between Orca3D Version 1 and Version 2.

Enhanced Features:

- Extended the Simerics CFD analysis command to allow the creation of Python script files for running multiple speeds sequentially. In order to run a Python script, you must first make sure you have Python installed. It is free and can be downloaded from here, <https://www.python.org/downloads/release/python-362/>. During installation, be sure to check the box that adds Python to your path. After installing Python 3.6, you may find that one component, win32api, was not installed by default and must be installed separately. To do so, open a Windows command prompt and type "python -m pip install pypiwin32" without the double quotes (if you don't know how to open a command prompt in your version of Windows, search "how to open a command prompt in Windows").

Work-In-Progress Release 1.4 (March 2018)

- As a result of a change in ownership, Orca3D is now copyrighted under Orca3D, LLC. All Orca3D libraries have been modified to reflect this new ownership.

New Features:

- A new command, OrcaCreateCfdReport, was added to allow extracting results from Simerics Marine Simulations to generate a report. The report is generated in Microsoft Excel and requires Excel 2016 or later. The principal intended use of the report is to summarize results across ship speeds, although it should work for a single speed. The command is still a work-in-progress, and new features are expected to be added with subsequent releases.

Enhanced Features:

- Extended the Simerics CFD analysis command to allow user-defined face attribution. Although faces must still be classified as "hull" faces or "deck" faces for gridding purposes, the ability to define new face

attributes allows post-processing of forces and moments based on user-defined boundaries.

Bug Fixes:

- Fixed a bug in the calculation of propeller open water coefficients for B-series propellers in Simerics CFD simulations. The magnitude of the error in the coefficients was dependent on the specific propeller characteristics.
- Fixed a bug in the Simerics CFD analysis command in which the Simerics 3D graphical view had mirroring turned on even for asymmetric simulations.

Work-In-Progress Release 1.4 (October 2017)

Bug Fixes:

- Fixed multiple forms for high-resolution scaling.

Work-In-Progress Release 1.4 (September 2017)

Enhanced Features:

- Modified Orca3D Simerics Marine Simulation meshing options to allow the user to choose "coarse", "normal", or "fine" Simerics meshing.
- Extended the Orca3D Simerics Marine Simulation command so that keyboard input is supported during interactive definition of propeller geometry.

Bug Fixes:

- Fixed a bug in the Orca3D Simerics Marine Simulation analysis command related to defining custom propeller Kt/Kq values.
- Fixed a bug in the display of Orca3D Simerics Marine Simulation face attributes which caused it to be very slow for large meshes.
- Modified network installation to target "All Users"

Work-In-Progress Release 1.4 (June 2017)

Enhanced Features:

- Extended the Orca3D Simerics Marine Simulation behavior to include a new "High Speed Displacement" template primarily for fast displacement hulls with transom sterns.

Bug Fixes:

- Fixed a units issue in the Orca3D Simerics Marine Simulation interface when using constant thrust/torque propeller option.

Work-In-Progress Release 1.4 (May 2017)

Enhanced Features:

- Modified the Orca3D Simerics Marine Simulation behavior so that when creating self-propelled simulations, the subfolder name containing the simulation includes the propulsor rpm.

Bug Fixes:

- In the Orca3D Simerics Marine Simulation interface:
 - Fixed a bug for self-propelled runs using constant thrust and torque input which resulted in zero thrust being produced.
 - Fixed a bug when specifying a simulation path that contains subfolders with restricted access which could cause Rhino to crash.
 - Fixed a bug related to using the Orca3D Marine CFD interface with non-US keyboard settings (when the decimal separator is not ".").
 - Fixed a bug in the Orca3D Marine CFD form in which floating point values specified using scientific notation were not being parsed properly and were thus being indicated as being invalid numbers.
 - Modified the behavior so that in "Adjust Meshes" when the user clicks the "Accept" button, the changes are accepted even if the user has not yet clicked the "Preview" button.

Work-In-Progress Release 1.4 (April 2017)

Enhanced Features:

- In the Orca3D Simerics Marine Simulation interface:
 - Implemented the ability to create self-propelled Simerics simulations by defining one or more propulsors in the model.
 - Modified the default Rhino meshing parameters for meshing the surface geometry for transfer to Simerics. Also implemented the ability to adjust the surface mesh created by the Rhino mesher for export to Simerics as well as the ability to display mesh faces whose area or aspect ratio are beyond a user-specified value.
 - Implemented the ability to accept closed Rhino mesh geometry as input to the marine simulation command. Previously only closed polysurface geometry was permitted. In addition to allowing users to create the marine simulation from native mesh geometry, this also allows users to create a mesh from a closed polysurface using native Rhino tools and perform any desired pre-processing on the mesh.
 - Added the ability to select more than one closed body for the

marine simulation. This allows users modeling catamarans to avoid having to model the connecting structure as long as it has no significant effect on the simulation.

- Added the ability to control the CFD mesh density and size of the domain created in the Simerics analysis. Also added logic to estimate the required time step and simulation length. This new functionality is only used if the user chooses to override the Simerics default values.
- Implemented persistence of all input to the Orca3D Marine CFD command.
- Made numerous modifications to the Orca3D Marine CFD user input form to make it simpler to understand and use.

Bug Fixes:

- In the Orca3D Simerics Marine Simulation interface:
 - Fixed several unit-related bugs when operating in non-SI unit systems
 - Fixed bugs related to model orientations other than the default x-longitudinal, z-vertical orientation
 - Fixed a bug in which the Rhino surface mesh of a closed polysurface was not necessarily a closed mesh.
- Fixed a bug in the Orca weight/cost calculator where changes to a weight item name were not persisted.

Work-In-Progress Release 1.4 (January 2017)

Bug Fixes:

- In the Orca3D Simerics interface:
 - Fixed selection of faces so that they un-highlight after assigning the face type
 - Fixed validation of hull type and analysis type
 - Fixed bugs in applying Orca3D's forward and up vectors within the Orca3dSimericsCommand to be consistent with the rest of Orca3D
 - Fixed issue with template file names when only one speed entered
 - Fixed a bug related to input control states not properly updating when the radio button for weight/cg or fixed float plane is clicked
 - Fixed several unit-related bugs when operating in non-SI unit systems (e.g., STL file geometry, distance from waterline to CG, etc.)
 - Fixed a bug related to behavior when file permissions prevent access to a file.
 - Fixed a bug in exporting kinematic viscosity instead of dynamic

- viscosity
- o Fixed a bug related to transformation of CG location

Enhanced Features:

- In the Orca3D Simerics interface:
 - o Modified the logic for assigning face attribution to display face attributes by color, to allow different types of attribution to be applied without returning to main form, and to initialize unattributed faces to be 'hull' faces
 - o Modified behavior of "Float" button to inform the user if the current hydrostatic values may be out of synch with the current user input values
 - o Added automatic creation of 3D views for free surface elevation and dynamic hull surface pressure once in Simerics.

Work-In-Progress Release 1.4 (November 2016)

Bug Fixes:

- Fixed regional settings bug affecting stability criteria hydrostatics

Work-In-Progress Release 1.4 (October 2016)

New Features:

- A new command was developed to interface Orca3D with the Simerics Multi-Physics (SimericsMP) Computational Fluid Dynamics (CFD) analysis tool. The command, OrcaSimericsAnalysis, has the ability to use the Design Condition or any user defined loading condition to compute the model's hydrostatics and world placement. The hull model must be a closed, solid body, and the user must attribute the Faces of the model as belonging to the Deck, Hull, or Transom. The command exports the model as custom STL files, and then creates the SimericsMP simulation files based on a Simerics Template and the analysis type (displacement or planing) for each speed to be analyzed. Finally, the command allows the user to launch SimericsMP with a selected simulation file. SimericsMP will open the simulation file and will automatically generate surface meshes and volume grids that are suitable for the requested simulation.

Enhanced Features:

- Split the developable hull assistant extension curve into unique forward and aft controls.

Bug Fixes:

- Fixed multiple bugs causing instability in the developable hull assistant. Improved handling of non-developable input data.

Work-In-Progress Release 1.4 (July 2016)

Enhanced Features:

- Added manual override for stability criteria evaluation angle limits.
- Added flat bottom control to developable hull assistant.

Bug Fixes:

- Fixed multiple bugs causing instability in the developable hull assistant.
- Addressed a unit persistence error in developable hull assistant.
- Improved error handling in cross curves of stability form.
- Fixed installation location of CommonDataFolder for 64-bit network client.

Work-In-Progress Release 1.4 (March 2016)

Please note that this release no longer supports Rhino v4. This and future Orca3D WIP releases require Rhino v5 (SR12 or later).

Enhanced Features:

- Incorporated an updated drag library from HydroComp, Inc.
- Updated intact hydrostatics reports to include a table of values when running cross curves evaluation.
- Added design hydrostatic condition import to the general hydrostatics form.

Bug Fixes:

- Removed dependency on Visual Studio Power Packs that was causing installation issues for some Windows 8/8.1/10 users.
- Fixed culture-specific list evaluation in planing hull wizard and RIB hull wizard causing improper behavior of the slider controls.
- Fixed chine determination for single surface hulls in lines drawing evaluation.
- Fixed bug where hull modifications using Orca3D tools may unintentionally split a surface along all creases.
- Fixed solver bug in stability criteria leading to failed stability analysis.
- Fixed broken help file hyperlinks to reflect changes to the Orca3D website structure.
- Fixed bug that caused the loss of saved developable hull assistant settings when migrating between the Orca3D release and WIP versions.

Work-In-Progress Release 1.4 (September 2015)

Please note that this release no longer supports Rhino version 4. This and

future Orca3D WIP releases require Rhino version 5 (SR 12 or higher for the 64-bit version of Orca3D).

Bug Fixes:

- Fixed a bug in the Orca3D stability criteria evaluation related to retrieving deck edge curves used in computing freeboard.
- Made additional changes to lines drawing command behavior related to persisting form settings and chine drawing.
- Modified developable hull assistant form so that the "Create Hull" button is not the default button. This addresses a behavioral issue in which users clicking <Enter> to accept a text field input caused the hull to be created before they were finished.

Work-In-Progress Release 1.4 (May 2015)

Please note that this release no longer supports Rhino version 4. This and future Orca3D WIP releases require Rhino version 5 (SR 10 or higher for the 64-bit version of Orca3D).

New Features:

- A new command, OrcaCrossCurves, has been added to allow the user to compute and report traditional cross curves of stability. See the Orca3D Help File for details on the use of this new command.

Enhanced Features:

- Extended the Orca3D hydrostatics CSV file output to include extended information for the rollover conditions when the option to include full output is selected.
- Made additional Orca3D commands scriptable including OrcaPointsOn, OrcaPointsOfInterest, OrcaCreateWeightCostPoint, OrcaProperties, OrcaInsertNet, OrcaInsertChine, OrcaWrapCorner, OrcaExportMeshes, OrcaCreatePlate.
- Modified the layer name used for the output of the hydrostatics floatation plane to include the condition the plane is associated with.
- Modified the Orca3D hull assistant form behavior so that the <Enter> key does not automatically create the hull geometry to avoid inadvertent hull creation. The user must click OK to create the hull.
- Implemented several Orca3D installation and licensing changes. Updated licensing files and services to the latest versions. Modified network-licensed product installation instructions and some of the network installation files to reduce likelihood of inadvertently running the incorrect installation. Packaged license diagnostic utilities in installation.

Bug Fixes:

- Fixed a bug in the Orca weight/cost manager in which directly editing a value in the manager grid control did not apply the proper units conversion.
- Fixed a bug in OrcaRemoveNet in which the surface normal was sometimes inadvertently flipped.
- Added call to set the “modified flag” of the current Rhino document for certain Orca3D commands.
- Fixed a bug in some Orca commands in which the general Rhino application setting, `m_bSplitCreasedSurfaces`, was not being properly reset to its original state at the command conclusion; this affected the following commands, `OrcaCreateFoil`, `OrcaCreateRIB`, `OrcaInsertChine`, `OrcaInsertNet`, `OrcaRemoveNet`, `OrcaCreatePlaningHull`, `OrcaHullAssistant`.
- Improved error handling in OrcaHoltropAnalysis so that certain geometries (e.g., catamarans) in which the transom finding logic could cause a crash are now more robust.
- Addressed a bug in Orca weight/cost reports where CG subtotal could be reported as a NaN instead of zero for zero weight totals.
- Applied several lines drawing bug fixes including an issue in using “selected curves” for the drawing, a problem where changing section locations or reading in a new model after a lines drawing was created did not allow future lines drawings to reflect the new sections, an issue where the bodyplan split location was being ignored, and an issue in which chine lines were not appearing in the drawing.
- Fixed bug in importing a Rhino model containing Orca3D units information into the current model that contains different Orca units.
- Added logic to prevent Orca3D sections that were made invisible through the Rhino layer control from reappearing during interactive Orca3D control point manipulation.
- Fixed a bug in the OrcaCreateWeightCostPoint which had crept into an earlier May 2015 WIP release in which the assignment of a point material was not being properly handled.

Work-In-Progress Release 1.4 (October 2014)

Please note that this release no longer supports Rhino version 4. This and future Orca3D WIP releases require Rhino version 5.

Enhanced Features:

- Rollover sub-report now shows heeling arm if applicable
- Points of interest now shown in same table as righting arm
- Added more helpful suggestions to the Planing Analysis error message

New Features:

- Added new command and report for ISO 12217-2 STIX calculation. This calculation calculates the 6.4 Minimum Righting Energy value and

category, the 6.5 Angle of Vanishing Stability value and category, and the 6.6 Stability Index (STIX) factors, values, and design category.

Bug Fixes:

- Exponential notation in Stability Criteria Analysis changed from Math.pow(x,y) to x^y
- Frequent null reference exception in Developable Hull Assistant corrected

Work-In-Progress Release 1.4 (April 2014)

Please note that this release no longer supports Rhino version 4. This and future Orca3D WIP releases require Rhino version 5.

New Features:

- Added a new hull assistant for creating developable surface models. This assistant takes a new approach to the developable surface problem and is based on a composition of conic and cylindrical surface patches that is guaranteed to form a mathematically developable surface model. See the Orca3D Help File for a detailed discussion of the new developable surface functionality.

Bug Fixes:

- Fixed a bug in the Orca tree view which had caused a crash in Rhino 5.
- Fixed some error condition message handling in Orca3D hydrostatics.
- Addressed a units and persistence issue related to overriding the initial plane height for free float hydrostatics in the Orca3D design condition.

Work-In-Progress Release 1.4 (January 2014)

Please note that this release requires Rhino version 4 service release 9 or later.

Enhanced Features:

- Extended command OrcaSelWeightCost to permit selection of weight/cost items by material type (point, curve, surface, solid, none) or by material name.
- Updated licensing file versions and modified network-licensed product installation to install both 32-bit and 64-bit client setup files.

Bug Fixes:

- Fixed a bug in the Orca hydrostatics report in which the TCB and TCF plot label could inadvertently read 10^0 .

Work-In-Progress Release 1.4 (June 2013)

Please note that this release requires Rhino version 4 service release 9 or later.

New Features:

- Re-enabled intact stability criteria evaluation and longitudinal strength functionality.

Release 1.3.1 (July 2013)

Please note that this release requires Rhino version 4 service release 9 or later, or Rhino version 5 service release 3 or later.

Bug Fixes:

- Fixed a bug in computing weight/cost properties for a block instance that contains a solid and that was created by mirroring another block instance.
- Fixed a bug in the scriptable version of OrcaProperties where unit settings were not being applied. This does not affect the interactive version of the command.

Release 1.3 (June 2013)

Please note that this release requires Rhino version 4 service release 9 or later, or Rhino version 5 service release 3 or later.

New Features:

- See new features list in release notes for 1.3 WIPs below

Enhanced Features:

- See enhanced features in release notes for 1.3 WIPs below
- Added an Orca3D property setting to provide the option to allow real-time section calculations to use mesh-based sectioning (an approximate approach that has always been done in the past versions of Orca3D) or alternatively to use surface-based real-time sectioning (which in past version had been used only on the final section update, which occurs when a control point move is completed). Rhino 5 in particular has a faster contouring capability which makes the use of surface-based real-time sectioning practical in most cases. The default value for this option is to use surface-based sectioning.
- Updated Orca3D licensing service and associated files to better support Windows 8.
- Added Short Tons to the available units options for Weight and Force

Bug Fixes:

- See bug fix list in release notes for 1.3 WIPs below
- Modified OrcaLinesDrawing command by adding new layer for ship outlines (shear, stem, etc) to fix behavior where these lines don't show up.

- Modified how hydrostatics reports transverse and longitudinal GM to address potential localization issues (use of decimal point vs. comma) when exporting hydrostatics to CSV or Excel.
- Modified resistance calculation routines to handle potential error conditions in the resistance sensitivity analysis.
- Fixed a bug that prevented the FastShip file type from showing up in the list of files types to open/import in Rhino 5.
- Improved handling of potential error condition when exporting curves to IDF via the OrcaExportCurves command.
- Fixed a bug in OrcaWrapCorner command in which the surface normal direction was inadvertently flipped in applying the corner wrap; also made a change to computation of corner wrap point location to accommodate different surface orders in the two parametric directions
- Modified the hydrostatics and stability form so that the Orca Weight Calculator is available with a Level 1 license.
- Modified the Orca3D tree to properly display layer visibility in Rhino 5. A limitation in the current Rhino 5 SDK limits the ability of third party developers to display/set sub-layer visibility. This is expected to be addressed in the next Rhino service release. A new Orca3D release is expected to be issued subsequent to that service release which will address sub-layer visibility.

Work-In-Progress Release 1.3 (March 2012)

Please note that this release requires Rhino version 4 service release 9 or later.

Enhanced Features:

- Many changes related to stability criteria evaluation to improve usability including a refactoring of the user interface. See the help file for more details.
- Made minor changes to the grouping functionality on the weight/cost report to improve readability.

Bug Fixes:

- Incorporated a new drag library from HydroComp that fixes an issue in the porpoising calculation.

Work-In-Progress Release 1.3 (November 2012)

Please note that this release requires Rhino version 4 service release 9 or later.

New Features:

- **64-bit Floating Network License** – the Orca3D network floating license is now available as a 64-bit capability so that users of Rhino 5

(64-bit) can use this functionality.

Enhanced Features:

- Added scriptable versions of OrcaAssignWeightCost and OrcaMergeStockMaterialLibrary commands.
- Modified RhinoMarine -> Orca3D translator to include 64-bit support.
- Modified the stability criteria evaluation to recognize hydrostatics-based keywords for evaluation.

Bug Fixes:

- Fixed bug in Orca3D lines drawing command which could sometimes a Rhino crash.
- Addressed several unit globalization issues.
- Addressed several issues in the stability criteria evaluation functionality including non-standard model orientations, keyboard settings, and adding "From" and redefining "Between" in the criteria limits.
- Modified Orca3D to handle possible corrupted application settings file (e.g., custom report settings). The settings file can become corrupt if Rhino crashes while the file is being written to disk. The current logic will still require a restart of Rhino.
- Addressed an issue in the Hull Assistant Library which sometimes caused the command to load slowly on first execution.

Work-In-Progress Release 1.3 (September 2012)

Please note that this release requires Rhino version 4 service release 9 or later.

New Features:

- **Developable Hull Assistant** - a new developable hull assistant has been started. This assistant, which is still under development, is based off of the planing hull assistant but is intended to allow the user to create fully developable hull shapes. The current implementation uses the Rhino surface lofting functionality to create the developable surfaces. However we expect to implement alternative methodologies for developable surface creation.

Enhanced Features:

- **Longitudinal Strength**
 - Numerous extensions have been made to the new Orca3D longitudinal strength functionality. These include the ability to define the sectional modulus either as a function of longitudinal location or as a single constant value and the ability to compute

the longitudinal distribution of bending stress. An initial output capability (CSV format only) has been included. The layout of the longitudinal strength form has been significantly improved. An auto-rebalance capability had been implemented.

- **Hydrostatics**

- Modified the logic that inserts the flotation plane to use a unique layer name for the plane object.
- Modified the scriptable version of the hydrostatics command to include an argument which optionally allows the user to show the hydrostatics report. Also allow surfaces to be “post-selected” in the scriptable hydrostatics command.

Bug Fixes:

- Fixed a potential bug in Orca3D CSV exports (hydrostatics, planing analysis, displacement analysis, material library, sectional area curve) as well as in curve export formats (IDF, ORC, Pias) that could occur with non-US language settings.
- Fixed a formatting issue in hydrostatics report when many objects are included in the computation.
- Modified scriptable version of planing analysis command to allow input of negative shaft angle.
- Fixed a bug in the planing analysis form related to the positive sense of the shaft angle when selecting shaft angle interactively via the “Place” button.
- Modified hydrostatics analysis form behavior so that the weight calculator is always available, even with a Level 1 license.

Work-In-Progress Release 1.3 (May 2012)

Please note that this release requires Rhino version 4 service release 9 or later.

New Features:

- **Longitudinal Strength** - a new command, OrcaLongitudinalStrength, was added. This command, which is still under development, is intended to allow Orca3D users to perform a longitudinal strength analysis using the hydrostatics and weight/cost capabilities built into Orca3D.
- **FastShip File Import** – a new capability was added to allow import of FastShip files. Now when you open, import, or insert files in Rhino, FastShip (.pex, .srf) files will be included in the file type filter. Note that surface trimming information is currently not imported.

Enhanced Features:

- **Hydrostatics**

- Modified hydrostatics CSV output to include separate condition number and condition name where the number is used as reference in the section and righting arm output. Modified the default condition names to be "Condition x" instead of "Load Case x."

Bug Fixes:

- Fixed a bug in hydrostatics CSV output in which the condition number index was not being incremented for sectional output.
- Fixed a bug in Moment To Trim and Weight To Immerse calculations in which the check of the current unit system was not being performed properly.
- Fixed a bug in stability criteria evaluation in which commas as the decimal delimiter (non-US keyboard settings) could cause a problem. Also fixed a bug in the Stability Criteria Evaluation form related to list order.

Release 1.2.3 (February 2012)

Please note that this release requires Rhino version 4 service release 9 or later.

Enhanced Features:

- **Hull Design**
 - Modified OrcaWrapCorner command to be more intuitive. Corners are shown numerically in the display and the effect of selecting a corner to wrap is shown dynamically before the command completes.
- **Licensing:** Migrated the Orca3D network license handling to a newer version of the third party licensing libraries.

Bug Fixes:

- Corrected licensing error messages
- Fixed scriptable command, OrcaCreatePlaningHull, to use the same default parameter values as the interactive hull assistant.
- Fixed OrcaInsertNet, OrcaInsertChine, OrcaRemoveNet, and OrcaWrapCorner commands to exclude selection of polysurfaces as well as to allow modifying the viewport display mode while the command is active.
- Modified Orca3D output reports (from hydrostatics analysis, resistance analysis, and weight/cost analysis) to use a long date time format for "Report Time" to avoid potential confusion.
- Fixed OrcaCreateLinesDrawing command to properly place diagonals on opposite side of waterlines for all orientations.

Work-In-Progress Release 1.2.2 (January 2012)

Please note that this release requires Rhino version 4 service release 9 or later.

New Features:

- **Licensing:** Migrated the Orca3D standalone license handling to a newer version of the third party licensing libraries. In addition to improved robustness, the new licensing libraries now support self-service activation through a user website for cases where Internet activation is not possible (because the computer where Orca3D is installed is not on the Internet or due to firewall restrictions). See latest Help file for details.

Enhanced Features:

- **Hull Design**
 - Modified the OrcaCreatePlate dialog box to allow the user to preview the control net (in addition to previewing surface isoparameters). Also fixed a bug in this form when preview was selected that caused TAB key to tab to the Rhino command line instead of next field in the dialog.
 - Improved performance of Orca section calculation when dragging many objects.
- **Weight/Cost**
 - Added logic to the Weight/Cost Manager dialog so that if the user attempts to edit a weight/cost property associated with a block instance, a message is provided that only the weight/cost properties associated with the block definition can be edited (if other non-block instance objects were selected they are given the option of editing them).
- **Hydrostatics and Stability**
 - Modified Orca3D Properties to include an option requiring that "Pre-float" checks be made to ensure validity of the model prior to computing hydrostatics. This option is turned on by default so that new users will be required to consider using Pre-float to review their models at least one time. However the option can easily be disabled by a single mouse click for experienced users.
 - Made minor formatting changes to hydrostatics output. Changed "Displacement" to "Displacement Weight" to clarify output.
 - Modified real-time hydrostatics and sectional area curve behavior so that hydrostatics and SAC respond to whole object manipulations (in addition to surface control point manipulations). Note that response to whole object manipulations only occurs when the object placement is complete, not while it is being dragged.

- **Resistance and Powering**
 - Modified the location of the legends in the resistance and powering reports to make them less likely to overlap with the plotted data.
- **Installation**
 - Made minor modifications to network installation instructions to improve clarity. Added the network license installation instructions to the network server distribution and added programs menu shortcuts for instructions, release notes and the network license manager.

Bug Fixes:

- Units Fixes – Fixed bug in unit conversion values for metric mass density units other than kg/m³.
- OrcaMove Fixes - Fixed OrcaMove ghosting and an incorrect real-time sectional area curve behavior, in which one move caused two sectional area curve updates.
- Hull Assistant Fixes – Fixed a bug in previewing control nets for hull assistants in which the control net would sometimes be clipped from the view.
- PIAS Export Fixes - Modified PIAS section export to meet the requirement of positive transverse coordinate (regardless of whether port/stbd is modeled). Added logic to join station segments by filling in gaps with straight line segments.
- OrcaWrapCorner Fixes – Fixed a bug in OrcaWrapCorner command in which surface normals were reversed in certain cases.
- Hydrostatics Fixes - Fixed a bug in the scriptable version of the OrcaHydrostatics command when using the "TransformModel" command option. Fixed a bug in which "undo-ing" a surface manipulation while real-time hydrostatics/sectional area curve were active did not cause a hydrostatics/sectional area curve update.
- Planing Analysis Fixes – Fixed a bug in Planing Analysis dialog box when interactively selecting shaft angle in which negative shaft angles were not recognized.

Work-In-Progress Release 1.2.1 (November 2011)

Please note that this release requires Rhino version 4 service release 9 or later.

New Features:

- **OrcaStraightenPoints:** Added a new command to place control points (or point objects) in a straight line in 3D, or in the 2D projection of a line.

Enhanced Features:

- **Hull Design**
 - **Lines Drawing:** Sections in the lines drawing are put on layers that mimic the Orca3D section layers in the model.

Bug Fixes:

- Lines Drawing Fixes - Addressed issue with diagonals being offset when the full hull was sectioned, addressed issue with scaling when the full hull was sectioned, all lines are now drawn on the same plane.
- Stability Criteria Fixes – Calculation of Hybrid Ratio corrected, calculation of areas under curves corrected, corrected calculation of heavy lifting and icing heeling arms.
- Resistance Prediction Fixes – Added total propulsive power output (PpTotal) to CSV export of planing hull and displacement hull analyses.
- Real-time Editing Fixes – Fixed a bug in which real-time hydrostatics did not update when moving control points via the OrcaMove control bar. Fixed a bug in which display of dynamic sections while editing control points was one mouse move behind in the active viewport.
- Lightweight Extrusion Objects – Fixed a bug in copying weight/cost data when copying lightweight extrusion objects in Rhino 5.

Work-in-Progress Release 1.2.0 (October 2011)

Please note that this release requires Rhino version 4 service release 9 or later.

New Features:

- **Native 64-bit Compatibility:** Developed a native 64-bit version of Orca3D targeted for the 64-bit version of Rhino 5. Note that due to an incompatibility issue between Orca3D and T-Splines (64-bit version only) real-time update of Orca3D sections when manipulating T-Splines objects has been temporarily disabled. It is anticipated that this issue will be addressed in the next release of T-Splines.
- **OrcaStabilityCriteria:** Added a new command, OrcaStabilityCriteria, which facilitates stability criteria evaluation. The command assumes that an Orca3D design condition has been defined and applies the evaluation to that condition. See the Orca3D Help File for more information.
- **Network Licensing:** Orca3D now supports floating network licenses. This allows licenses to reside on a network server and be passed out to client users in the network as needed. See the Orca3D Help File for additional information.
- **Real-time Sectional Area Curve:** Added a real-time sectional area curve capability. This capability is accessed in the Orca3D Design

Hydrostatics command and form along with the option to define reference sectional area curve values. The real-time sectional area curve is displayed in its own dockable window using a custom control which allows a range of functionality including zooming, panning, image capture as well as export to a CSV file of the current and reference SAC values. The reference values can be defined individually in a grid, can be imported from a CSV file, or can be initialized from the current station locations.

- **OrcaInsertNet:** A new command, OrcaInsertNet, was created for adding surface control net rows/columns while attempting to maintain the surface continuity and uniformity. This command is an alternative to the standard Rhino command for inserting control points which removes surface discontinuities.
- **OrcaRemoveNet:** A new command, OrcaRemoveNet, was created for removing surface control net rows/columns while attempting to maintain the surface continuity and uniformity. This command is an alternative to the standard Rhino command for removing control points which removes surface discontinuities.
- **RIB Assistant:** A new hull assistant, RIB Assistant, was added to the OrcaHullAssistant command for the creation of Rigid Hull Inflatable Boats (RIBs). The assistant defines a simple planing hull with an inflatable tube attached at the gunwale. The resultant surfaces are trimmed and joined appropriately for ease of manipulation and hydrostatic analysis.
- **ORC Offset File:** Added an initial implementation of offset file (.off) export compatible with the ORC (Offshore Racing Congress) requirements (see <http://www.orc.org>). The capability can be accessed through the OrcaExportCurves command. Offset files generated from this implementation will generally require some further editing but should address the most time-consuming parts of creating the files.
- **OrcaManageWeightCost:** Added the ability to enable or disable individual weight/cost items in the Weight/Cost manager. The user can enable/disable selected items, enable all items, disable hidden items, or select Rhino objects to enable. Disabled items are not included in the weight/cg calculations for the design stability condition or general stability calculations when clicking the compute weight/cg button. For weight/cost reports, a new report option was added to report enabled items only.
- **Pre-Float:** Added a "Pre-Float" check to Orca3D hydrostatics that allows basic validation of input to the hydrostatics including checks for 1) CG within bounds of selected surfaces 2) no surfaces with negative displacement 3) consistency of sections and selected surfaces. Included a "Flip" option to automatically flip surfaces that have

negative displacement or to allow them to remain selected for user review. If block instances are encountered they are not flipped but the user is notified.

- **Custom Reporting:** Added a custom reporting capability for Orca3D output of hydrostatics and stability, planing hull resistance analysis, displacement hull resistance analysis, and weight and cost reporting. See the Orca3D Help File for details on this capability.

Enhanced Features:

- **Hull Design**

- **Hull Assistants:** Modified hull assistants to allow user to define custom sections or use default sections when displaying the current hull. Added defined stations (custom or default) to the hydrostatics computation so section-based properties are available. Orca3D sections will be created from the hull assistants if Preview Sections is turned on when the hull is created.
- **Hull Assistants:** Modified the hull assistant forms for improved functionality and ease of use. Added slider controls to allow dynamic manipulation of dimensional parameters. Added ability to display surface control nets. Made hull assistant surface display mode match the viewport display mode. Added front and back face color for interactive display of hull assistant geometry to the Orca3D properties.
- **Hull Assistants:** Added object names to surfaces created by Orca3D hull assistants.
- **Planing Hull Assistant:** Added default draft override and mid-deadrise override options on the Planing Hull Assistant. Changed parameter values for default planing hull.
- **Lines Drawing:** Added labeling of diagonals.
- **Curve Export:** Made OrcaExportCurves command scriptable. Modified PIAS export to mark knuckles in the output and to use Orca model orientation to write section curves from stern to bow and keel to deck.

- **Hydrostatics and Stability**

- **Blocks:** Added the ability to compute hydrostatics for block instances containing surfaces, polysurfaces, and meshes.
- **Sectional Area Curve:** Added drawing of sectional area curve in the Rhino model when Insert Flotation Plane option is selected in hydrostatics. Added section area curve color and scale factor to Orca3D properties.
- **Weight Calculator:** Added persistence of weight items entered in the Orca3D weight calculator in the Rhino model file. Previously any items entered in the calculator were temporary in

that closing Rhino would cause that data to be cleared.

- **Output:** Added option to allow user to choose parameter to sort output results on for hydrostatics calculations with multiple load conditions. Modified hydrostatics report output to include up direction and forward direction on details pages.
- **Resistance and Powering**
 - **Resistance Analysis:** Added optional CSV output of drag analysis (Holtrop and Savitsky) results to both interactive and scriptable versions of the resistance analysis commands (in latter case if chosen it replaces ReportViewer output). This facilitates scripted access to resistance results.
 - Combined individual buttons for specifying propeller location in planing hull analysis into a single button.
- **Weight/Cost**
 - **Blocks:** Added the ability for blocks to contain weight/cost information. Weight/cost data that is assigned to Rhino objects used to define the block will cascade up to the block instances.
 - **Import/Insert:** Added the ability to merge weight/cost information into the current model when importing or inserting a Rhino file.
 - **Stock Material Library:** Added the ability to export/import a comma-separated-variable (CSV) file for the Orca3D stock material library. The functionality is accessed through the OrcaMergeStockMaterialLibrary and OrcaExportStockMaterialLibrary commands by selecting "CSV" as the file type. When importing materials, an attempt is made to compare the imported materials with existing materials (either by unique identifier or by name which is not unique) and allow the user to determine if existing materials are to be replaced or new materials are to be added.
 - **OrcaReportWeightAndCost:** Extended the command for creating weight/cost reports to allow object grouping. A new form was incorporated to allow the user to select reporting and grouping options which include no grouping (the default behavior), grouping by Rhino layer, and grouping by Rhino object group.
 - **OrcaCreateWeightCostPoint:** Modified the command, OrcaCreateWeightCostPoint, and the associated form to allow the user to specify a point material to assign to the point instead of using no material.
 - **Negative Weights:** Allow the user to enter negative weight and cost values, but issue a warning.
 - **CG for Points:** Modified the form for assigning stock materials so that if a point object is selected you cannot assign CG location

(it must be the same as the point location). Any other objects can have the CG location assigned even if a point material is selected.

- **Miscellaneous**

- **Rhino 5:** Modified Orca3D to accommodate the new Rhino 5 lightweight extrusion objects in weight/cost and hydrostatics functionality.
- **OrcaViewPorts:** Modified behavior of OrcaViewports to not save current layout or restore; now a separate command OrcaLayout handles caching and restoring of a single layout during current rhino session; modified toolbar to have OrcaViewports/4View on one button and OrcaLayout Cache/Restore on a new button
- **Toolbar additions:** Added Lasso Points to Rhino toolbar distributed with Orca3D.

Bug Fixes:

- Modified Orca3D as well as deployment projects to use ReportViewer 2010 to fix bug related to displaying points of interest in a rollover analysis; this also requires distribution of a later .NET framework (currently .Net 3.5 SP1); this required modifying PointOfInterest to expose World/Body location as individual double values and to modify the POI report definition files to use these
- Modified the command for assigning weight/cost properties to Rhino objects, OrcaAssignWeightCost, to behave properly in response to the Rhino Undo command. Unfortunately, it still does not respond properly to the Rhino Redo command due to a bug in Rhino 4 in which plug-in commands are not informed when a redo event occurs.
- Modified weight/cost behavior so that weight/cost properties cannot be assigned to Orca3D sections since they will be lost the next time the sections are recomputed.
- Fixed foil assistant errors with bulb size/location
- Fixed hull assistant display bug when linked viewports was turned on.
- Fixed bug in Planing Hull Assistant in which longitudinal distribution of deadrise was affected by model size and units.
- Fixed a units bug in calculation of Mt and Ml in hydrostatics; fixed a units bug in reporting of dimensional meshing parameters used for hydrostatics; fixed a units bug in reporting or points of interest location
- Changed calculation of Draft to be the minimum wet extent instead of the difference. Affects fully submerged models.
- Lines Drawing Fixes - TSplines and large hulls; Lines Drawing Form fixes; addressed issue with perimeter curves not showing up on certain models.
- Updated offset table plug-in to work without Orca plug-in being

loaded; fixed a bug in offset table in which if Orca was not loaded, curve selection option was not correctly interpreted; also updated error message if no curves are found; modified offset table plug-in to create new worksheet in Excel workbook if needed for output.

- Modified the OrcaViewports command to leave Rhino page views unaffected; fixed bug in OrcaViewports command so that cplane positive axes will now always point fwd, stbd, and up for each view
- Added logic to the area calculation of the Section class to make it work in Rhino 4 and Rhino 5; they appeared to have changed the positive sense of the area between versions
- Fixed bug in OrcaWrapCorner command related to tolerances for coincident control points; fixed bug in OrcaWrapCorner for case where transverse direction is not the "y" axis direction.
- Fixed bug in scriptable version of OrcaHydrostatics for the case where righting arm calculation is enabled and load case is defined by sinkage, trim, and heel.
- Fixed bug in scriptable version of OrcaHoltropAnalysis command where the input minimum speed value was ignored. Fixed an orientation bug in Holtrop analysis in getting forward waterplane ending.
- Fixed bug in OrcaExportCurves command in which planar curves were being exported as 3D curves.

Release 1.1.0 (April 2010)

Please note that this release requires Rhino service release 6 or later.

New Features:

- **OrcaCreateFoil:** A new command was added for creating 3D foil shapes based on a 2D cross section. OrcaCreateFoil allows the user to choose a 2D foil section shape and specify the shape in planform including span, root and tip chord lengths, and trapezoidal or elliptical planform. Custom foil sections can be imported. A sample csv file is included to demonstrate how to import new foil offsets. The root and/or tip of the foil can be capped. A bulb body of revolution can optionally be added at the foil tip. This command also allows the user to analyze the volume, weight, and center of mass of the foil prior to creation.
- **OrcaCreatePlate:** A new command, OrcaCreatePlate, was added to create a flat Nurbs surface of specified degrees and number of control points. This command also allows the user to specify the location and orientation of the surface.
- **OrcaHullAssistant:** A new command, OrcaHullAssistant, has been added that lets the user create and manage hull shapes. This command replaces the previous Orca3D commands, OrcaCreateSailboat, OrcaCreateShipHull, OrcaCreatePlaningHull,

although the scriptable versions of these commands remain in place for script use. OrcaHullAssistant allows the user to save specific combination of hull assistant settings in a library to be retrieved or modified for future use. Hull assistant settings can also be exported/imported to a file.

- **OrcaViewports:** A new command, OrcaViewports has been added that lets the user setup viewports in Bodyplan, Profile, Planview, and Perspective views, taking account of the user-specified model orientation in Orca3D Document Properties. Initial display settings for the Orca3D viewports including grid lines display, grid axes, world axes icon, background gradient, control polygon culling, and bow direction can be set using the OrcaProperties command. OrcaViewports replaces the OrcaViewport macro in previous versions.
- **OrcaSelWeightCost:** A new command, OrcaSelWeightCost, allows users to select "normal" (e.g. unlocked and visible) Rhino objects that have or don't have (at the user's option) Orca3D weight/cost properties associated with them.
- **OrcaManageWeightCost:** A new command, OrcaManageWeightCost, allows the user to manage Orca3D weight/cost properties. This includes viewing current weight/cost properties including weight/cost totals, adding weight/cost points, and editing/deleting weight/cost properties.
- **OrcaProperties/Units:** The OrcaProperties command has been modified to allow the user to choose a currency unit label for cost input/output. Note that unlike other Orca3D units, there is no conversion factor associated with cost units. The command was also modified so that when a Custom unit system is chosen, the user can copy units from another non-custom system as a starting point. Also made default speed unit knots for all standard unit systems and the default power unit horsepower for imperial systems and kilowatts for SI systems
- **OrcaProperties:** OrcaProperties now allows the user to specify the forward and up directions for the current model. This removes the orientation restrictions on other Orca3D commands that required a particular model orientation. Note that specifying the model orientation via OrcaProperties does not transform your Rhino model in any way. It merely provides orientation information to Orca3D about the orientation of your model for use in other Orca3D commands (e.g. hydrostatics, drag analysis, lines drawing). If you wish to change the orientation of your model you need to use the native Rhino transformation commands (e.g. rotate).
- **Hydrostatics/weight integration:** Orca3D hydrostatics calculations have been integrated with weight properties. In the Orca3D command for defining the design hydrostatics condition

(OrcaDefineDesignSimulation), the user now has the option to "Link to Orca3D Weight/Cost Items". This option, available only when defining the design condition with a weight/center, will automatically extract the weight and center of gravity from the total of all currently defined weight/cost properties. This link is "live" in the sense that changes/additions to weight/cost properties will be automatically reflected in the design condition. In the Orca3D command for computing non-design hydrostatics (OrcaHydrostatics), the user now has the options to get the weight/CG from the currently defined weight/cost items or to use a simple weight/cg calculator to define the weight and center. These non-design options are static computations and thus are not automatically updated as weight/cost properties change.

- **OrcaHydrostatics:** Orca3D hydrostatics now allows the user to define virtually any combination of loading conditions in analysis using the "Custom Conditions" feature. In previous versions of Orca3D, the user could define many loading conditions for an analysis using the ellipsis syntax in the input fields. The resulting output would contain all combinations of the specified input values. Now the user can customize the collection of loading conditions to exclude or modify specific conditions. Further details on this functionality are provided in the Help file.
- **T-Splines Compatibility:** Orca3D has been made to be compatible with the T-Splines plug-in for Rhino (see <http://www.tsplines.com>). Orca3D sections can be cut through T-Splines objects and these sections will update dynamically as control points are edited. T-Splines objects can also be used for Orca3D hydrostatics analysis and can have Orca3D weight/cost properties assigned to them.

Enhanced Features:

- **User Interface:** Orca3D forms have increased error checking, logical tab orders, and improved resizing behaviors. The real-time hydrostatics form is now dockable and allows the user to choose the hydrostatics information to display. The lines drawing form has been modified to use a tabbed form due to the increased number of user options. The Orca3D toolbar behavior has been modified to allow the user to show names on the toolbar buttons. The Rhino model/filename has been added to the hydrostatics, powering, and weight/cost reports.
- **Orca Meshing:** Changed default Orca3D meshing parameters (used for hydrostatics and other Orca3D calculations) to obtain a more precise mesh at a cost of a slightly slower computational speed. The user can still set the Orca3D meshing parameters using OrcaProperties. Also changed the Orca3D Document Properties form to

have new options for setting mesh parameters. These include "Orca3D Default", "Custom(Basic)", and "Custom(Advanced)". See the help documentation for a complete description.

- **OrcaHydrostatics:** Added the ability to use multiple ellipses in lists (eg. 1,2,...30,35...90). Added "Weight to Immerse" and "Moment to Trim" values to the hydrostatics condition detailed output, and added GM_T and GM_L to the hydrostatics condition summary. Modified the station data plot so that immersed area and immersed girth are plotted to a similar scale by using exponential notation. Added list of Rhino objects selected for hydrostatics calculation to hydrostatics output. Users who want to script the OrcaHydrostatics command can now retrieve the resulting hydrostatics values from their script. A sample script demonstrating how to do so is included in the distribution. CSV file hydrostatics output is now an option for both the interactive and scriptable versions of the OrcaHydrostatics command. This provides users with a format they can use to customize their hydrostatics output and also provides a way to write scripts that analyze the hydrostatics output. Added non-dimensional longitudinal locations of center of buoyancy and center of flotation as measured from the aft end of the waterline (measurements from forward waterline ending are already included). Added decimal places to some of the hydrostatics output which is especially useful for smaller models. Improved readability of the computed sectional area curve by removing wetted girth from the plot.
- **OrcaDefineDesignSimulation:** If a design hydrostatics condition has already been defined in Orca3D, then the OrcaDefineDesignSimulation command will display the current design condition. Modified "real-time hydrostatics" behavior to make real-time hydrostatics window open immediately after the OrcaDefineDesignSimulation command is complete. Real-time hydrostatics window stays visible now even when the Rhino application is deactivated.
- **OrcaAssignWeightCost:** Users can now assign Orca3D weight/cost properties to Rhino mesh objects. Also, the form for assigning weight/cost to a Rhino geometry object has been modified to allow the user to filter the types of materials to choose from and to show the name of the Rhino object (when a single object is selected).
- **OrcaReportWeightAndCost:** Modified the weight/cost report to use separate pages for weight and cost and to add a column for the dimensional basis used for computing weight/cost, i.e. the length, area, or volume associated with the Rhino object (N/A is reported if all weight or cost values were directly assigned). For the stock materials page of the report, if a material is not in the user's material library it is denoted by prepending "local" to the material name. Also modified the

OrcaReportWeightAndCost command to have a command argument indicating what Rhino objects to include in report (all objects, visible objects, selected objects).

- **Orca3D Drag Prediction:** The Orca3D drag prediction library, provided by HydroComp, Inc. has been updated. The new version has improved error checking and allows non-integer speed increments for both Holtrop and Savitsky analyses.
- **OrcaCreateLinesDrawing:** Enhancements to the Orca3D lines drawing functionality include: the user is now able to specify which lines to include in the lines plan (Orca3D sections, all curves, selected curves), specify if x,y,z axes are shown in all three views, and specify the longitudinal location at which to split between fore and aft sides of the bodyplan view (stations and perimeter curves). This command now shows the maximum scale that will fit on the sheet size, and allows the user to adjust the text size for the labels. Diagonals, cants, and inclines are projected to their own plane in the lines drawing. Internal surface chines (defined by multiple surface knots) are now drawn in the lines drawing.
- **OrcaSections:** Modified Orca3D sections behavior so that if a section has a curvature graph turned on, it retains that setting after surface control points are moved and placed. Modified behavior of form for defining Orca3D sections to better handle issues related to negative section spacing values.
- **OrcaPointsOn:** Orca3D control points now draw net rows/columns corresponding to multiple knots in the surface in a user-specified color. This color is specified using the OrcaProperties command and is referred to as the "Chine Color".
- **Planing Hull Assistant:** Changed the default interactive behavior of the planing hull assistant so that the "mid-deadrise" angle is linked to the transom deadrise angle by default. This gives more usable hull shapes when modifying transom deadrise. The user can adjust the mid-deadrise angle independently if desired by clicking the associated checkbox.
- **Ship Hull Assistant:** The Orca3D ship hull assistant has been vastly improved to allow much better control of the hull shape, especially in the forebody. The user can also independently control side slope and deadrise angles, the flare curvature of the hull sides, the stem profile curvature, the forefoot shape, and the bow rounding. See the Orca3D Help file for complete details.
- **Sailboat Hull Assistant:** The sailboat assistant has been improved to allow independent control of hull flare and deadrise angles.
- **Orca3D Hull Assistants:** All of the hull assistants were improved to show section preview in a different color from the hull wireframe preview. Currently the section preview color is the same as that

specified in the Orca3D properties for the "Chine Color".

- **OrcaWrapCorner:** Modified the command behavior so that Rhino viewports are not fit to extents after command completion.
- **OrcaInsertChine:** Modified the command to permit object snapping when selecting the chine insertion point. If intersection snapping is enabled, the chine can be inserted at selected iso-parametric mesh lines by selecting near u-v mesh line intersections. Also fixed a bug in which pressing <ESC> during point selection still inserted the chine.

Bug Fixes:

- **Sailboat Hull Assistant:** Now allows negative transom heights (i.e. transom immersion).
- **Planing Hull Assistant:** Fixed a bug when setting transom deadrise angle to zero in which a non-zero chine width was not properly accounted for.
- **Hull Assistants:** Fixed a bug in the preview hydrostatics for the Orca3D hull assistants.
- **OrcaCreateLinesDrawing:** Fixed a bug that caused a crash if no printers were installed. Fixed the format of A-sized sheets to fully fit the lines on the paper. Fixed a bug in which the views were sometimes not properly located.
- **OrcaMove:** Fixed several bugs that caused crashes.
- **OrcaExport:** Fixed a bug in export of sections to PIAS format.
- **OrcaHydrostatics:** Fixed a bug in which running non-design hydrostatics after design hydrostatics were defined, could affect the defined design condition. Also fixed a bug in computing Ax and station of max area when there is parallel midbody and many sections are defined in the PMB. Fixed an intermittent bug in computing immersed girths in certain instances. Fixed a bug in the units label for righting moment. Fixed a bug in presentation of Mt and MI which is now measured from the resultant flotation plane. Modified computation of non-dimensional station of maximum area to be from the forward end of waterline instead of from the origin. The dimensional location is still measured from the origin. Fixed a bug in serialization of fluid density. Improved the overall stability and robustness of the Orca3D hydrostatics calculation engine.
- **OrcaAssignWeightCost:** Fixed a bug that caused a crash if a Rhino object is assigned a name containing a backslash ("\"). Rhino point objects that have weight/cost properties assigned to them can only get their CG location from the point itself. You cannot assign the CG for a point object. Also fixed a units bug in the CG calculation for weight/cost points for units other than meters.
- **Orca Weight/Cost:** Fixed a bug in the Orca3D weight/cost calculation when objects with weight/cost properties were copied or mirrored.

Also fixed a bug that occurred when Rhino objects with Orca weight/cost properties were joined or exploded.

- **OrcaPlaningAnalysis:** Modified section cutting/merging logic for complex geometries with holes, spray rails, tunnels, etc., to make the planing analysis more robust.
- **Orca Units:** Fixed a units conversion bug for moment values.
- **OrcaSections:** Fixed a bug in the preview of Orca3D sections for non-orthogonal sections (e.g. diagonals, cants, inclines).

Release 1.0.14 (November 7, 2008)

New Features:

- **OrcaInsertChine:** A new command was added to allow a user to insert a chine (i.e. slope discontinuity) into a surface along an iso-parameter. The command allows the user to choose the parametric direction, u or v.

Enhanced Features:

- **OrcaAssignWeightCost:** The form for assigning weight/cost to a Rhino geometry object has been modified to allow the user to create new materials by selecting "Add New Material(s)..." from the dropdown list.
- **OrcaAssignWeightCost:** The command now allows selection of more than one object at a time for assigning weight/cost properties. A "Clear" button was added to the form for assigning weight/cost properties to allow a user to remove weight/cost properties from selected objects.
- **OrcaReportWeightAndCost:** Added a progress bar during weight/cost report generation since calculations can be time consuming.
- **OrcaCreatePlaningHull:** The Planing Hull Assistant has been modified so that the resulting hull surface is degree 3 in both parametric directions. It had been degree 2 in one direction.
- **OrcaPlaningAnalysis, OrcaHoltropAnalysis:** The resistance analysis commands have been modified to allow the user to export the calculation to HydroComp NavCad and SwiftCraft files.
- **OrcaWrapCorner:** Added a check to see if the selected surface is trimmed. If so the user is notified that the command will remove trimming information and given the option to proceed or quit.
- **OrcaHydrostatics:** The OrcaHydrostatics command is now scriptable.

Bug Fixes:

- **Internationalization:** Made numerous changes to facilitate using Orca3D with international keyboard settings. In order to be consistent

with Rhino, Orca3D requires all input using "." as the decimal separator and "," as the list separator.

- **Hydrostatics:** Fixed a unit conversion error in output of righting moment in lb-ft units.
- **OrcaCreateLinesDrawing:** Fixed a bug in display of block and prismatic coefficients when length and volume units are not consistent. Fixed a bug in display of wetted surface area value.
- **OrcaReportWeightAndCost:** Fixed a bug in which cost item output was sometimes denoted as having been set directly when it was computed from the associated geometry properties.

Release 1.0 (October 1, 2008)

- **Weight and Cost Module:** New functionality has been added for tracking weights and costs of geometric objects. A stock materials list facilitates rapid and consistent tracking of commonly used materials. Summary reports of weight and cost can be generated for the model.
- **OrcaMove:** Fixed a bug which did not allow control points from multiple surfaces to be moved, and improved the preview mode for more consistent operation when moving multiple types of objects simultaneously.
- **Report Format:** Adjusted the format to allow for a larger company logo. Extraneous blank pages were removed from the reports.
- **Planing Hull Assistant:** Fixed a bug which caused the chine height adjustment not to work.
- **Toolbar Settings:** Fixed a bug which prevented toolbar settings from being saved in Windows Vista.
- **Orca Sections:** No longer become selected when editing a surface.
- **OrcaHoltropAnalysis:** A new command, OrcaHoltropAnalysis, provides a method to compute the hull resistance and power of a displacement hull model. The command uses the HydroComp Drag Prediction Library and is based on the Holtrop method for computing resistance. A propulsive efficiency is entered by the user to compute propulsive power.

WIP Release 4.1 (September 2, 2008)

- **Units:** Fixed several issues related to units used in hydrostatics and speed/power calculations.
- **Orientation:** Fixed a bug in model orientation settings which occurred when reading in files saved in earlier WIP releases.
- **Formatting:** Modified the number format used in the section area and section girth hydrostatics output.

WIP Release 4 (August 29, 2008)

New Features:

- **OrcaOffsetTable:** A new command, OrcaOffsetTable, allows users to create traditional offset tables from a selected set of planar curves. When the command is run the user is prompted to include all curves, include Orca3D sections, or to select the curves to use for the offset table. The command opens Excel (must be installed on end-user machine for command to work) and generates the offset table output.
- **OrcaPlaningAnalysis:** A new command, OrcaPlaningAnalysis, provides a method to compute the hull resistance and power of a planing hull model. The command uses the HydroComp Drag Prediction Library and is based on the Savitsky method for computing resistance. A propulsive efficiency is entered by the user to compute propulsive power.
- **Licensing:** Added Orca menu item to start Orca3D License Manager as well as shortcuts to the Start menu. Also added current license status to Orca3D About box.

Enhanced Features:

- **OrcaCreateLinesDrawing:** Several enhancements were made to the Orca3D lines drawing functionality. Instead of having to specify the page size, dropdown lists of connected printers and available page sizes are presented. A custom paper size option is still offered. Portrait and landscape page orientation options have been added as have options to display/hide the title block, page border and section labels. Labeling of section curves is a new functionality. For station curve labeling, the user is provided the option to input station spacing and a station 0 location. The title block has been enhanced with more detail and available input. If the user has defined a "Design Hydrostatics Condition" an option to include principal characteristics on the drawing based on the hydrostatic properties at the design condition is included. The body plan view now shows stations aft of amidships mirrored about centerline as in a traditional lines drawing. Lines drawing geometry is placed on a unique "Lines Drawing" layer incorporating date and time of creation. The drawing border, title block, and section labels are placed on their own sub-layers. Finally, if the user tries to create a lines drawing but has not defined any Orca sections, a warning message is issued.
- **OrcaCreatePlaningHull:** Modified the behavior of this command so that the hull is created as a single surface (in addition to the transom and deck). Previously the hull was created as a polysurface which meant it had to be exploded in order to perform control point editing.
- **Hull Assistants:** Improved user interface error handling to trap

invalid input. Also changed "Stem" text occurrences to "Bow" to minimize confusion ("Stem" sometimes looks like "Stern" with certain fonts).

- **OrcaDesignHydrostatics:** Inform user if no design condition has been defined when attempting to compute design hydrostatics and provide option to define the design condition.
- **OrcaTheater:** Modified so that the theater page opens in a modeless form so that the user can continue to work in Rhino while the form is open.
- **OrcaSections:** Implemented the capability to import Orca section definitions from another 3dm file.
- **Persistence:** Improved robustness of logic to read and write Orca3D document data to 3dm files.
- **Help and Documentation:** Updated existing and created new Help Videos documenting the use of many of the Orca3D capabilities. Extended Orca3D Help documentation. Implemented context-sensitive help in Orca3D forms and added Orca commands to Rhino command help.

Bug Fixes:

- **OrcaCreatePlaningHull:** Fixed a bug in retrieving/applying Chine Height at Stem input parameter.
- **OrcaCreateSailboat:** Fixed a bug in sailboat hull assistant in which a manual change to the beam at transom text box did not cause an update when leaving the textbox.
- **OrcaHydrostatics:** Improved robustness for large heel angles and in handling ranges of input conditions. Modified the computation of LCB/Lwl and LCF/Lwl to be independent of longitudinal location of origin.
- **OrcaSections:** Fixed a bug in the definition of diagonals which had been using the transverse coordinate instead of the vertical coordinate.
- **Hull Assistants:** Fixed a bug in the unit labels for dimension input which originated when converting Hull Assistants to modeless forms.
- **Orca Toolbar:** Changed the location of the Orca3D toolbar from the Orca installation folder to the "Common Application Data" folder. This was done to allow saving of changes to the toolbar location on Windows Vista where the standard user does not have permissions to write to the Orca installation folder. The location of the Command Application Data folder varies with operating system (typically "c:\documents and settings\all users\..." on Windows XP and "c:\program data\..." on Windows Vista).

WIP Release 3 (June 30, 2008)

New Features:

- **OrcaProperties:** Implemented the line type functionality for Orca3D control nets, set from the OrcaProperties command.
- **OrcaPointsOfInterest:** Implemented a new "Points of Interest" functionality in Orca3D. Points of Interest are defined via the OrcaPointsOfInterest command. They are used in any hydrostatics/stability calculation. The hydrostatics output reports the distance of the points of interest to the resultant waterplane. Points of Interest have an activation flag so they can be disabled/enabled at will. They are persisted with the 3DM file.
- **OrcaMove:** Implemented a new command, OrcaMove. This command allows the user to perform complex manipulations of geometry objects and Orca3D surface control points via a custom user control. This includes absolute or relative translations in either Cartesian or polar coordinates. Use of the up and down arrows permits the user to nudge the selected entities as needed.
- **Licensing:** Implemented a licensing mechanism within Orca3D. This mechanism will allow the end user to try out demo/evaluation versions, to purchase and activate a licensed version, to move a license from one machine to another, and to perform various other licensing operations.

Enhanced Features:

- **Hull Assistants:** Added session persistence to the Orca Hull Assistants so values entered will be remembered the next time that assistant is re-opened during the same session.
- **Hull Assistants:** Add content to Rhino document notes whenever a user creates a new hull via a Hull Assistant to indicate date of creation and parameters used.
- **Hull Assistants:** Implemented modeless forms for Orca3D hull assistants so that the user can modify the view while working with the assistant.
- **Hull Assistants:** Made the Orca3D Hull Assistant commands, OrcaCreateSailboat, OrcaCreatePlaningHull, OrcaCreateShipHull scriptable.
- **General User Interface:** Made numerous text, format, and behavioral changes to enhance the user experience.
- **OrcaExportCurves:** Added a default part name for IDF export since some programs will not accept a blank part name.
- **OrcaHydrostatics:** Modified hydrostatics calculations so that stations are computed on the surfaces selected for hydrostatics, regardless of what surfaces have Orca3D sections defined. If there is a mismatch between surfaces selected for hydrostatics and the surfaces for which

- Orca3D sections are defined, a warning message is issued to the user.
- **OrcaHydrostatics:** Made hydrostatics more robust for unusual resultant flotation plane attitudes.
 - **OrcaProperties:** The user can now specify a logo file to use in Orca3D hydrostatics output. If the logo file specified cannot be found, the default Orca3D logo is used.

Bug Fixes:

- **OrcaHydrostatics:** Only compute section properties for those sections with the "calculation" checkbox set during hydrostatics calculations.
- **OrcaHydrostatics:** Fixed a bug in computation of section properties for heeled models.
- **OrcaProperties:** Fixed a bug in the behavior of the Orca Properties form when switching water density.
- **Globalization:** Fixed a bug which prevented use of Orca3D on computers with non-US keyboard settings. All Orca3D input should use US keyboard settings (decimal separator is "." and list separator is ",") as in Rhino.

WIP Release 2 (May 1, 2008)

New Features:

- **OrcaHydrostatics:** Added an option to insert the resultant flotation plane in the hydrostatics command. Also added an option to alternatively transform the model so that z=0 represents the resultant flotation plane. When either of these options is selected, Orca3D places points representing CB and CF. It labels and groups these objects with their associated flotation plane in case multiple flotation planes are being computed.
- **Reports:** Hydrostatics reporting now uses the Microsoft ReportViewer control. This control makes for faster reporting and has a much smaller installation footprint; User formats are supported through the use of the MS Express Web Developer with the appropriate report designer add-in
- **OrcaSections:** A new command to refresh the Orca3D Sections has been added (OrcaSectionsRecompute). It is assigned to the right mouse button on the Sections icon.
- **Real-time Hydrostatics:** The ability to see real-time hydrostatics while editing a surface has been added. This is enabled via the Design Hydrostatics.
- **Export Formats:** IDF and PIAS formats can now be exported using the Orca Sections that have been defined.

Enhanced Features:

- **Installation:** The installation program now opens the user's default web browser to display the Orca Theater html page, so that installation is not interrupted. It also now works with a FireFox browser.
- **OrcaProperties:** The handling of SI, Imperial, and Custom units has been overhauled. A user can now choose from four pre-defined Orca3D Unit Preferences: SI-kg, SI-tonne, Imperial-lbs, Imperial-LT. Further, a user can now choose a *Custom* units scheme, which allows the selection of specific units for different categories, e.g. volume in foot³ and area in inch². The *Custom* settings are accessed via the *Show Units* button.
- **OrcaExportCurves:** Default file extensions are now added when exporting to IDF or PIAS file formats.
- **OrcaHydrostatics:** Through the use of report parameters, the project, company, and analysis info is shown on all hydrostatics report pages.
- **OrcaHydrostatics:** BM, GM, LCF, TCF, and VCG values have been added to the condition summary and the summary has been slightly restructured.
- **OrcaHydrostatics:** Added button to access Orca3D Properties from the hydrostatics form
- **OrcaHydrostatics:** Modified the behavior of the Hydrostatics input dialog so that if Model Sinkage is chosen, Model Heel and Model Trim are automatically selected and LCG,TCG are disabled; if Weight is chosen all options are available.
- **Orca3D Tree:** The Orca Tree now supports multiselect.
- **OrcaSections:** Orca Sections may no longer be deleted with Rhino's Delete command. They can only be deleted by removing them in the Orca Sections dialog. They also cannot be edited directly. You must make a copy if you want a curve that is editable.
- **OrcaSections:** Made all of the layers created for Orca Sections a child of the "Orca3D Sections" layer. Removed the option to put all sections on one layer; the default color of sections is by layer; right-clicking section(s) and setting color changes the color to By Object or lets user set it to ByLayer.
- **OrcaSections:** Orca Sections are now given names according to their type and location.
- **OrcaSections:** The Orca Sections tree now allows multiselect.
- **OrcaSections:** Behavior has been changed so that the Orca Sections are updated any time a surface is transformed or modified. Real-time (dynamic) updating still only occurs when editing Orca Control Points.
- **Real-time Sections:** When moving Orca control points with Sections updating in real-time, after each move the Sections would be selected. This has been corrected.

Bug Fixes:

- **General:** Various spelling errors have been fixed.
- **Orca3D Toolbar:** Issues regarding the visibility of the toolbar have been fixed.
- **Orca3D Tree:** Inserting control points into a surface while the Orca Tree was on caused an error. This has been fixed.
- **Orca3D Tree:** Fixed an error where the lightbulb indicator in the Orca Tree would be off for items that were just grouped.
- **Orca3D Tree:** Fixed a bug in the Orca Tree where a layer could remain highlighted in the tree after an object had been selected in the graphical window.
- **OrcaCreatePlaningHull:** Planing hull assistant did not allow flat sheer line. This is now allowed. Corrected in the Sailboat Assistant as well.
- **OrcaHydrostatics:** Stability calculations at 90 and 180 degrees are now correct.
- **OrcaHydrostatics:** Corrected waterplane inertia unit labels in hydrostatics output.
- **OrcaHydrostatics:** Fixed the reporting of section locations in the Hydrostatics output to reflect the current units.
- **OrcaHydrostatics:** Hydrostatics reports no longer include blank pages for section and righting arm data if that data is not available.
- **OrcaHydrostatics:** Corrected error in the reporting of TCF.
- **OrcaHydrostatics:** Corrected waterplane area calculation in English units.
- **OrcaProperties:** Removed zoom extents behavior after OK on OrcaProperties dialog.
- **OrcaSections:** Error caused when Preview was used in the Sections dialog before defining any sections has been fixed.
- **OrcaSections:** Corrected error that caused the section calculation checkbox to not remain unchecked.
- **OrcaSections:** The names of Orca Sections now update in the tree to reflect a change in units.
- **OrcaSections:** The options in the Orca Sections dialog are preserved for each Section type.
- **OrcaTree:** The Orca Tree was modified so that it no longer slows way down when large models are loaded.
- **Real-time Hydrostatics:** The units in real-time hydrostatics would not reflect the units of a model that was read in while the real-time hydro window was open. This has been fixed.
- **Real-time Sections:** Corrected error that when recomputing sections; locked sections and section layers did not get deleted when they should have been.
- **Real-time Sections:** Corrected a problem that caused the real-time

section line types to not be correct.

- **Vista OS:** Fixed a bug that caused a crash when exiting in the Vista operating system.

WIP Release 1 (Feb 29, 2008)

The Work-In-Progress (WIP) is intended to begin the process of soliciting feedback from the user community. While every attempt is made to release stable code, it does not undergo as thorough a testing process as a commercial release. After receiving feedback, there may be major changes in functionality.